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ABSTRACT

This supplementary math curriculum guide for use with Spanish-speaking students in Chicago public schools' seventh and eighth grade classes employs a contrastive analysis approach. Lessons are presented for objectives for which the instructional strategies used in the United States differ from those in Spanish-speaking countries. (Objectives for which the methodology is the same are taught from the standard math curriculum.) Every lesson has four parts: (1) an explanation of the differences in the instructional strategies used in Spanish-speaking countries and the U.S.; (2) a student activity, in Spanish, to reinforce students' skills in using their native language and methodologies; (3) suggestions for facilitating students' transition from their native methodology to the U.S. methodology; and (4) a transitional activity which provides students with practice in solving problems using both methodologies and languages. Major topics covered are sets, place value, rational numbers, and real numbers. An English-Spanish vocabulary list is provided. (CMG)

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SUPPLEMENT FOR CURRICULUM GUIDE FOR MATHEMATICS: SPANISH-SPEAKING STUDENTS

GRADES 7-8

SUPLEMENTO DE LA GUIA DIDACTICA DE MATEMATICAS PARA LOS ESTUDIANTES DE HABLA HISPANA

SEPTIMO Y OCTAVO GRADOS

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PREFACE

A contrastive analysis approach to curriculum development is used in the Supplement for Curriculum Guide for Mathematics: Spanish-Speaking Students to enlighten both the bilingual teacher and the English-speaking classroom teacher regarding differences in the teaching methodology of the United States and Spanish-speaking countries.

Lessons have been developed for the objectives for which the instructional strategies used in the United States differ from those used in Spanish-speaking countries. Teachers are requested to use the Curriculum Guide for Mathematics to teach those objectives for which the same methodology is used in the United States and Spanish-speaking countries. It is important to note that instruction in every objective taught in the school system is provided for the Spanish-speaking student.

Every lesson has four parts:

an explanation for the teachers to acquaint them with the differences in the instructional strategies used in Spanish-speaking countries and in the United States

an activity for the students to reinforce their skills in using the language and methodology of their native countries

suggestions for the teachers to facilitate the students' transition from the methodology used in Spanish-speaking countries to the methodology used in the United States

a transitional activity designed to prepare students to use the standard algorithm of the Chicago public schools curriculum by providing practice in solving problems using the methodology and language of Spanish-speaking countries and the United States.

The sequence of objectives in the mathematics program of the Spanish-speaking countries may vary from that of the Chicago curriculum. Where there is variation in the order of the objectives, the sequence of the Chicago public schools curriculum is used.

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STRAND	YEAR 7 (Level U)		YEAR 8 (Level V)	
	Objective	Pages	Objective	Pages
Sets			1-V-9	32-35
Place Value	2-U-3 2-U-4	2- 7 8-12		
Rational Numbers	4-U-3 4-U-6 4-U-11 4-U-16	13-16 17-20 21-24 25-29	4-V-2 4-V-4 4-V-5	36-40 41-44 45-49
Real Numbers			8-V-2	50-53

The major topics included for grades 7 and 8 are sets, place value, rational numbers, and real numbers.

The standard page format provides basic information for each objective. Information includes the following. STRAND, OBJECTIVE, OBJECTIVE CODE, and SUGGESTED ACTIVITIES.

GRADE 7

Place Value

2-U-3 Read and write base ten numerals in exponential form.

2-U-4 Read and write base ten numerals in scientific notation.

Rational Numbers

4-U-3 Given two mixed numerals with like or unlike denominators, subtract the numerals.

4-U-6 Given two fractional numbers, divide the numbers.

4-U-11 Given two decimal fractions, subtract the fractions.

4-U-16 Given decimal fractions, divide the fractions.

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STRAND **PLACE VALUE** OBJECTIVE CODE **2-U-3**

OBJECTIVE Read and write base ten numerals in exponential form.

SUGGESTED ACTIVITIES

The place value system and the methods used to read and write numbers in some Spanish-speaking countries differ from the system and method used in the United States.

PART I

Spanish-Speaking Countries Method	United States Method
3,826,171,382,467.0	3,826,171,382,467.0
OR	
3.826.171.382.467,0	
OR	
$3^{2}826,171^{1}382,467.0$	
Tres billones, ochocientos veintiseis mil, ciento setenta y un millones, trescientos ochenta y dos mil, cuatrocientos sesenta y siete	Three trillion, eight hundred twenty-six billion, one hundred seventy-one million, three hundred eighty-two thousand, four hundred sixty-seven

$$(3\times10^{12})+(8\times10^{11})+(2\times10^{10})+(6\times10^{9})+(1\times10^{8})+(7\times10^{7})+$$

$$(1\times10^{6})+(3\times10^{5})+(8\times10^{4})+(2\times10^{3})+$$

$$(4\times10^{2})+(6\times10^{1})+(7\times10^{0})$$

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PART I (continued) 2-U-3

In some Spanish-speaking countries, such as Spain, numbers are written with points in place of commas for period division, and with a comma in place of a point for decimal division:

3.826.171.382.467,0 ----- 3,826,171,382,467.0

In some Spanish-speaking countries, such as Peru, indexes 1,2,3,...are used to indicate millions, billions, trillions ...respectively.

$3^{2}826,171^{1}382,467.0$ ----- 3,826,171,382,467.0

In Spanish-speaking countries, the thousands are read and written as singular (2,000 = dos mil) but hundreds, millions, hundred millions...are plural (100 = doscientos; 3,000,000 = tres millones).

In Spanish-speaking countries, such as Mexico, each six digits is named a period and each three digits, a class. This contrasts with the United States method of naming each three digits a period. In the Spanish-speaking method, 10^{6} is named one million, 10^{9} is named one thousand million, and 10^{12} is one billion. In the United States 10^{9} is one billion.

VALOR RELATIVO

3,	8	2	6,	1	7	1.	3	8	2,	4	6	7
unidades de billón	centenas de millar de millón	decenas de millar de millón	unidades de millar de millón	centenas de millón	decenas de millón	unidades de millón	centenas de millar	decenas de millar	unidades de millar	centenas	decenas	unidades simples
13 orden	12 orden	11 orden	10 orden	9 orden	8 orden	7 orden	6 orden	5 orden	4 orden	3 orden	2 orden	1 orden
Billones	Millares de millón			Millones			Millares			Unidades		
Quinta clase	Cuarta clase			Tercera clase			Segunda clase			Primera clase		
Tercer período	Segundo período						Primer período					

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PART II **2-U-3**

Escribe los números en cifras en notación desarrollada.

Números Letras	Números en Cifras	Notación Desarrollada
1) **Cuatro billones, novecientos treinta y cinco mil** ochocientos ochenta y dos millones, doscientos veintiseis mil, quinientos ochenta y tres		
2) **Nueve billones, doscientos cuarenta y un mil** quinientos setenta y dos millones, ciento doce mil, setecientos sesenta y cuatro enteros y un décimo		
3) **Un billón, cuatrocientos** once mil, trescientos treinta y tres millones, doscientos cincuenta y nueve mil, ochocientos tres		

Escribe en cifras:

1) $(5x10^{12})+(9x10^{11})+(4x10^{10})+(2x10^{9})+(4x10^{8})+(3x10^{7})+(2x10^{6})+$

$(9x10^{5})+(7x10^{4})+(5x10^{3})+(3x10^{2})+(3x10^{1})+(2x10^{0})+$

$(4x10^{-1})+(3x10^{-2}) =$ _____

2) $(6x10^{12})+(9x10^{11})+(7x10^{9})+(4x10^{8})+(3x10^{6})+(1x10^{3})+$

$(1x10^{0})+(2x10^{-1}) =$ _____

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PART III

2-U-3

Review how numbers are written in the Spanish-speaking countries and then teach the United States method.

Review: (a) 3.678.979.143.985,0

(b) $3^{2}{,}678{,}979^{1}{,}143{,}985.0$

Teach: 3,678,979,143,985.0

Review the Spanish-speaking countries method for reading numbers and then teach the United States method--

dos millones ------- two thousand

Review the place value system of Spanish-speaking countries and then teach the place value system of the United States--

unidades	**units**
decenas	tens
centenas	hundreds
unidades de millar	thousands
unidades de millón	millions
but	
millares de millón	billions
billones	trillions

3,678,979,143,985

Periodo II Periodo I

3,678,979,143,985

Period IV Period III Period II Period I

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PART IV 2-U-3

Write the digits for each number; then write each number in expanded notation. Use both methods.

Escribe los números en cifras y luego escríbelos en notación desarrollada, usa ambos métodos.

Number in Words Números Letras	Digits Números en Cifras	Expanded Notation Notación Desarrollada
Siete billones, seiscientos veinte y dos mil novecientos cuarenta y tres millones, quinientos cincuenta y un mil, doce.		
Five trillion, six hundred forty-two billion, two hundred thirty-seven million, five hundred sixty-four thousand, two hundred thirty-one.		
Ocho billones, cuarenta mil, quinientos ocho millones, setecientos cuarenta y dos mil, ciento treinta y cuatro enteros y un décimo.		
One trillion, nine hundred fifty-two billion, two hundred seventy-six million, four hundred thirty-eight thousand, nine hundred twenty-seven and two hundred fifty-four thousandths.		

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PART IV (continued) 2-U-3

Write the numbers in expanded notation.

Escribe los números en notación desarrollada.

1) 5,649,213,515,946.0

2) 6^{2},514,410^{1},252,603.0

3) 2.004.611.298.752,21

4) 3,423,935,209,011.218

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STRAND PLACE VALUE OBJECTIVE CODE 2-U-4

OBJECTIVE Read and write base ten numerals in scientific notation.

SUGGESTED ACTIVITIES

In Spanish-speaking countries each numerical period has six places; in the United States each numerical period has three places. In Spanish-speaking countries the third numerical period is called billions. (See 2-U-3.)

The separation of periods varies among countries; some use the comma and others use the point.

PART I

Spanish-Speaking Countries Method	United States Method
The indexes 1 and 2 indicate a period of six and twelve places respectively:	In the United States, indexes are not used to designate numerical periods.
$3^{2}490{,}000^{1}\ 000{,}000$	3,490,000,000,000
$3{,}49 \times 10^{12}$ (A comma is used in some countries.)	3.49×10^{12} (A decimal is used.)
$3^{2}\ 490{,}000^{1}000{,}000$	
3.49×10^{12} (A point is used in some countries.)	

In writing a number in scientific notation, the students in some Spanish-speaking countries use the decimal comma and multiply the number in the greatest place value position by 10 to the nth power. N is indicated by the number of places to the right.

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PART 1 (continued) 2-U-4

Spanish-Speaking Countries Method

United States Method

$3^{2}820.000^{1}000.000 = 3{,}82 \times 10^{12}$

The example above is read by Spanish-speaking students as--

three billions, 820 thousand millions.
tres billones, 820 mil millones.

The indexes 1 and 2 indicate the six-place periods of millions and billions respectively.

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PART II 2-U-4

Escribe los siguientes números usando notación científica.
Escribe como se lee cada número.

Ejemplos:

$3^{2}{,}194{,}000^{1}{,}000{,}000 = 3.194 \times 10^{12}$

Se lee 3 billones 194 mil millones.

$538^{2}{,}000{,}000^{1}{,}000{,}000 = 5.38 \times 10^{14}$

Se lee 538 billones.

$3.8 \times 10^{15} = 3{,}800^{2}{,}000{,}000^{1}{,}000{,}000$

Se lee tres mil ochocientos billones.

1) 350,000,000 =

2) 78 000,000,000,000 =

3) 4.95×10 =

4) 7×10 =

5) 1×10 =

6) 3.5×10 =

7) 1,979 =

8) 15,000 =

9) 12,000,000 =

10) 120,000 =

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PART III 2-U-4

Explain the difference between the Spanish-speaking countries method and the United States method of reading periods. Point out the use of commas to separate the periods in the United States.

Spanish-Speaking Countries Method	United States Method
$8.5 \times 10^{12} = 8,500,000,000,000$	$8.5 \times 10^{12} = 8,500,000,000,000$
Read: ocho billones, quinientos mil millones.	Read: eight trillion, five hundred billion.
$1 \times 10^{15} = 1,000,000,000,000,000$	$1 \times 10^{15} = 1,000,000,000,000,000$
Read: mil billones.	Read: one quadrillion.
$1 \times 10^{18} =$ $1,000,000,000,000,000,000$	$1 \times 10^{18} =$ $1,000,000,000,000,000,000$
Read: un trillón.	Read: one quintillion.

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PART IV **2-U-4**

Read the amounts by using both methods.

Lee las cantidades utilizando ambos métodos.

Spanish-Speaking Countries Method	United States Method
1) $9.5 \times 10^{10} =$	2) $9.5 \times 10^{10} =$
3) 1,000 MILES =	4) 1,000 MILES =
5) 10,000 KM =	6) 10,000 KM =
7) 150,000,000,000 =	8) 150,000,000,000 =
9) 5,920,000,000 =	10) 5,920,000,000 =

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STRAND RATIONAL NUMBERS OBJECTIVE CODE 4-U-3

OBJECTIVE Given two mixed numerals with like or unlike denominators, subtract the numerals.

SUGGESTED ACTIVITIES

In Spanish-speaking countries the students convert a mixed numeral directly to an improper fraction and then find the common denominator.

PART I

Spanish-Speaking Countries Method

$$4\frac{1}{4} - 2\frac{3}{6} =$$

$$\frac{17}{4} - \frac{15}{6} =$$

$$\frac{51 - 30}{12} =$$

$$\frac{21}{12} =$$

$$1\frac{9}{12} = 1\frac{3}{4}$$

United States Method

$$4\frac{1}{4} = 4\frac{3}{12} = 3\frac{15}{12}$$

$$-2\frac{3}{6} = 2\frac{6}{12} = 2\frac{6}{12}$$

$$1\frac{9}{12} = 1\frac{3}{4}$$

Step 1. Convert each mixed fraction to an improper fraction.
Step 2. Find a common denominator.
Step 3. Convert each fraction to an equivalent fraction using the new common denominator.
Step 4. Perform the operation indicated.

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PART II

4-U-3

Resuelve los siguientes problemas:

1) $6\frac{1}{2} - 2\frac{1}{3} =$

2) $16\frac{3}{8} - 8\frac{5}{8} =$

3) $15\frac{2}{5} - \frac{1}{4} =$

$35\frac{1}{2} - 25\frac{1}{2} =$

5) $17\frac{7}{9} - 9\frac{2}{3} =$

$46\frac{3}{4} - 17\frac{4}{5} =$

7) $27\frac{3}{4} - \frac{1}{3} =$

$125\frac{3}{15} - 83\frac{6}{14} =$

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PART III

4-U-3

Write and compare both methods. Show the students the conversions that occur in each problem and point out the similarities and differences in the methods.

Spanish-Speaking Countries Method

Example:

$3\frac{1}{2} - 2\frac{2}{3} =$

Each mixed numeral is converted to an improper fraction.

$\frac{7}{2} - \frac{8}{3} =$

The common denominator is found. The numerators are subtracted. The difference is a proper fraction.

$\frac{21 - 16}{6} = \frac{5}{6}$

United States Method

Example:

$3\frac{1}{2} = 3\frac{3}{6} = 2\frac{9}{6}$

$2\frac{2}{3} = 2\frac{4}{6} = 2\frac{4}{6}$

$\frac{5}{6}$

Each mixed numeral is rewritten with a common denominator.

The difference is found by subtracting a fraction from a fraction and a whole number from a whole number, after checking that the subtraction of the fractional part is possible. If subtraction is not possible, one unit from the whole number should be converted to the fraction $\frac{6}{6}$ and added to the fraction $\frac{3}{6}$ to make $\frac{9}{6}$.

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PART IV

4-U-3

Solve these problems by using both methods:

Resuelve estos problemas usando ambos métodos:

	Spanish-Speaking Countries Method	United States Method
1)	$16\frac{3}{4} - 11\frac{1}{2} =$	$16\frac{3}{4} =$ $-\ 11\frac{1}{2} =$
2)	$22\frac{2}{3} - 18\frac{3}{4} =$	$22\frac{2}{3} =$ $-\ 18\frac{3}{4} =$
3)	$41\frac{5}{6} - 27\frac{2}{3} =$	$41\frac{5}{6} =$ $-\ 27\frac{2}{3} =$

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STRAND RATIONAL NUMBERS OBJECTIVE CODE 4-U-6

OBJECTIVE Given two fractional numbers, divide the numbers.

SUGGESTED ACTIVITIES

The method for dividing fractions in Spanish-speaking countries differs from the United States method. The symbol used for division is also different.

PART I

Spanish-Speaking Countries Method

$$\frac{2}{3} \div \frac{12}{80} =$$

The fractions are multiplied in crisscross fashion.

$$\frac{2}{3} \cdot \frac{12}{80} = \frac{160}{36}$$

$$= 4\frac{4}{9}$$

Note: The meaning of these division symbols is the same:

$$: \quad \div$$

United States Method

$$\frac{2}{3} \div \frac{12}{80} =$$

The reciprocal of the divisor is used.

$$\frac{2}{3} \times \frac{80}{12} =$$

The fraction is reduced to lowest terms.

$$\frac{\overset{1}{\cancel{2}}}{3} \times \frac{\overset{40}{\cancel{80}}}{\underset{3}{\cancel{12}_{6}}} = \frac{40}{9}$$

The improper fraction is converted to a mixed numeral.

$$\frac{40}{9} = 4\frac{4}{9}$$

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PART II

4-U-6

Resuelve los siguientes problemas:

1) $\frac{8}{9} \div \frac{2}{3} =$

2) $\frac{5}{8} : \frac{6}{7} =$

3) $\frac{8}{10} : \frac{4}{9} =$

4) $\frac{6}{7} \cdot \frac{9}{10} =$

5) $\frac{2}{7} : \frac{1}{4} =$

6) $\frac{8}{9} \div \frac{1}{3} =$

7) $\frac{4}{6} \div \frac{2}{9} =$

8) $\frac{1}{6} \div \frac{4}{7} =$

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PART III 4-U-6

Explain the Spanish-speaking countries method by demonstrating that fractions are divided by cross multiplying the numerator of the dividend by the denominator of the divisor to find the numerator of the quotient, and the numerator of the divisor by the denominator of the dividend to find the denominator of the quotient.

Example:

$$\frac{2}{3} \div \frac{1}{2} = \frac{4}{3} = 1\frac{1}{3}$$

Explain that in the United States fractions are divided by multiplying by the reciprocal of the divisor.

Example:

$$\frac{2}{3} \div \frac{4}{2}$$

$$\frac{1}{\cancel{2}}{}^{\cancel{2}}/_{3} \times \frac{\overset{1}{\cancel{2}}}{\underset{1}{\cancel{4}_{2}}} = \frac{1}{3}$$

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PART IV

4-U-6

Solve the following problems:

Resuelve los siguientes problemas:

Multiplica en forma de cruz.

1) $6\frac{1}{2} : \frac{2}{3} =$

3) $5\frac{1}{4} \div \frac{1}{9} =$

5) $15\frac{1}{10} : \frac{1}{5} =$

7) $8\frac{5}{9} \div 2\frac{7}{9} =$

9) $9\frac{8}{9} : 1\frac{1}{5} =$

Divide.

2) $\frac{1}{5} \div \frac{1}{6} =$

4) $4\frac{1}{7} \div \frac{1}{4} =$

6) $3\frac{1}{3} \div \frac{4}{6} =$

8) $6\frac{8}{9} \div \frac{1}{4} =$

10) $\frac{9}{10} \div \frac{4}{5} =$

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STRAND RATIONAL NUMBERS OBJECTIVE CODE 4-U-11

OBJECTIVE Given two decimal fractions, subtract the fractions.

SUGGESTED ACTIVITIES

The subtraction process in the Spanish-speaking countries is done by modifying the subtrahend. Instead of reducing the minuend, the subtrahend is increased.

Part I

Spanish-Speaking Countries Method

$$\begin{array}{r} 6.7^{1}5 \\ 5.4_{1}6 \\ \hline 1.2\ 9 \end{array}$$

One tenth is borrowed from 7 tenths and converted to 10 hundredths. Ten hundredths is added to 5 hundredths to make 15 hundredths.

Six hundredths from 15 hundredths is 9 hundredths. The 9 is written under the 6. The 1 tenth that was borrowed is written next to the 4 tenths in the subtrahend.

The 4 tenths in the subtrahend is renamed mentally to form 5 tenths. Five tenths from 7 tenths is 2 tenths. The 2 is written under the line; the decimal point is brought down.

Five from 6 is 1. The 1 is written under the line.

United States Method

$$\begin{array}{r} {\scriptstyle 6} \\ 5.7^{1}5 \\ 5.4\ 6 \\ \hline 1.2\ 9 \end{array}$$

Seven tenths is renamed to form 6 tenths and ten hundredths. One tenth plus 5 hundredths makes 15 hundredths.

Six hundredths from 15 hundredths is 9 hundredths. The 9 is written in hundredths place.

Four tenths from 6 tenths is 2 tenths. The 2 is written in tenths place; the decimal point is brought down.

Five from 6 is 1. The 1 is written in units place.

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PART II **4-U-11**

Resta los siguientes números:

1) 7.25
- 5.36

2) 8.26
- 7.34

3) 8.66
- 6.78

4) 6.78
- 5.86

5) 3.46
- 2.57

6) 6.75
- 5.46

7) 5.26
- 4.37

8) 8.27
- 5.36

9) 6.26
- 5.34

10) 5.34
- 4.26

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PART III 4-U-11

Review the subtraction process for decimal fractions used in Spanish-speaking countries. Then introduce the United States method.

Spanish-Speaking Countries Method

$$\begin{array}{r} 7\overset{1}{,}2\overset{1}{1}6 \\ -\,5\overset{1}{,}3\overset{1}{1}7 \\ \hline 1,\ 8\ 9 \end{array}$$

United States Method

$$\begin{array}{r} 6\ 1\ 1 \\ 7,1\not{2}\ {}^{1}6 \\ -\,5,3\ 7 \\ \hline 1,\ 8\ 9 \end{array}$$

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PART IV 4-U-11

Subtract the following numbers by using both methods shown in the example.

Resta los siguientes números usando los dos métodos de acuerdo con los ejemplos.

Spanish-Speaking Countries Method	United States Method
$4\,.\,{}^{1}3^{1}2$	$3\ 12$
$-\ 1_1.\ 6_1 3$	$4.\ \not{3}^{1}2$
$2\,.\,6\,9$	$-\ 1.\ 6\ 3$
	$2.\ 6\ 9$

1) 5.27
- 4.36

2) 2.16
- 1.08

3) 3.78
- 2.69

4) 7.86
- 5.75

5) 8.78
- 5.69

6) 8.69
- 5.78

7) 6.56
- 4.77

8) 7.88
- 5.76

9) 6.53
- 5.45

10) 8.24
- 7.46

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STRAND RATIONAL NUMBERS OBJECTIVE CODE 4-U-16

OBJECTIVE Given decimal fractions, divide the fractions.

SUGGESTED ACTIVITIES

In some Spanish-speaking countries the method and symbol used in the division process differ from the method and symbol used in the United States.

PART I

Spanish-Speaking Countries Method		United States Method	
Dividend) Divisor		Divisor 32	Quotient
74 10 | 2.30		2.30 | 74.10	Dividend
5 10 32	Cociente	69 0	
50		5 10	
Residuo		4 60	
		50	Remainder

In Spanish-speaking countries --

The dividend is written to the left of the symbol.

The divisor is written to the right of the symbol.

The subtraction is done mentally. Only the remainders are shown below the digits that were divided.

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PART II

4-U-16

Divide las siguientes fracciones decimales:

1) $839.2 \div 3.1$

2) $28.75 \div 2.5$

3) $93.00 \div 3.1$

4) $389.7 \div 1.4$

5) $2.4\overline{)78.9}$

6) $3.2\overline{)675.3}$

7) $2.4\overline{)657.3}$

8) $5.1\overline{)367.2}$

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PART III 4-U-16

Spanish-Speaking Countries Method	United States Method
Divide	Divide:
49.26 by 2.4	49.26 by 2.4

Explain that the division of decimal numbers by decimal numbers is accomplished by multiplying the dividend and divisor by 10, 100, or 1,000 according to the places in the divisor. Then the division algorithm is performed.

49.26 | 2.4

Multiply dividend and divisor by 10.

492.6 | 24

1 2

24 goes into 49 two times.
Write the 2 under the quotient line below the 4.
Multiply mentally: 2 x 4 = 8.
Subtract mentally: 9 - 8 = 1.
Write 1 under the 9.

492.6 | 24

01 2

Multiply mentally: 2 x 2 = 4.
Subtract mentally: 4 - 4 = 0.
Write 0 under the 4.

492.6 | 24

012 20

Bring the 2 down from the dividend to form 12.
Think: 24 does not go into 12. In the quotient, write 0 next to the 2 to form 20.

2.4 | 49.26

20.5

24 | 492.6

48

126

120

006

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PART III 4-U-16

```
4 9 2. 6   |2 4
0 1 2        2 0
```

Move the decimal point to the quotient to form a 20.

```
4 9 2. 6   |2 4
0 1 2 6      20.5
```

Bring the 6 down from the dividend to form 126. Think: 24 goes into 126 five times. In the quotient, write 5 after the decimal point.

```
4 9 2. 6   |2 4
0 1 2 6      20.5
      6
```

Multiply mentally: 4 x 5 = 20.
Subtract mentally: 26 - 20 = 6.
Write 6 under the 6.

```
4 9 2. 6   |2 4
0 1 2 6      20.5
      6
```

Carry over the 2 tens.

```
4 9 2. 6   |2 4
0 1 2 6      20.5
    0 6
```

Multiply mentally: 2 x 5 = 10.
Add the product 10 to the 2 that was "carried over."
Subtract mentally: 12 - 12 = 0.
Write 0 under the 12.

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PART IV 4-U-16

Divide the following decimal fractions:

Divide las siguientes fracciones decimales:

1) $32.1 \div 2.1$

2) $2.1 \overline{)32.1}$

3) $19.8 \div 1.8$

4) $1.8 \overline{)19.8}$

5) $24.48 \div 3.14$

6) $3.14 \overline{)24.48}$

7) $532.12 \div 2.15$

8) $2.15 \overline{)532.12}$

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GRADE 8

Sets

1-V-9 Given an English phrase or sentence, write a mathematical phrase or sentence.

Rational Numbers

4-V-2 Given two positive rational numbers with like and unlike denominators, determine their sum or difference.

4-V-4 Given two decimals, determine their sum or difference.

4-V-5 Given two decimals, determine product or quotient.

Real Numbers

8-V-2 Given a square number, designate its two sets of like factors (positive and negative) and identify the positive factor as the principal square root.

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STRAND SETS OBJECTIVE CODE 1-V-9

OBJECTIVE Given an English phrase or sentence, write a mathematical phrase or sentence.

SUGGESTED ACTIVITIES

PART I

Spanish-Speaking Countries Method	United States Method
Following are examples of mathematics phrases in Spanish and in English.	
Ejemplos:	Examples:
Divide 25 entre 2.	Divide 25 by 2.
el producto de 7 por A	the product of 7 and A
4 más que x	four more than x

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PART II **1-V-9**

Expresa en forma de ecuación algebráica las siguientes oraciones o frases matemáticas:

1) **tres más que** m

2) **ocho menos nueve**

3) **Seis es mayor que** b.

4) Nueve es menor que trece.

5) **tres menos cinco**

6) Divide n entre 10.

7) 25 es mayor que X.

8) 25 más que X

9) 25 menos que X

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PART III 1-V-9

Teach students that the word más in Spanish is translated as more and as plus. Help students to realize that --

2 más que X	2 more than X	X + 2
2 más X	2 plus X	2 + X

Provide students with opportunities to interpret Spanish and English phrases. Use flash cards, charts, or other examples.

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PART IV 1-V-9

Match the following phrases in column one with those in column two.

Parea las siguientes frases de la columna #1 con las de la columna #2.

Spanish-Speaking Countries Method	United States Method
___1) La suma de x más 4	a) The product of 7 and A
___2) El producto de 7 por A	b) 4 times the number of dimes (D)
___3) 3 menos que N	c) One-half of the product of the base (B) and the height (H)
___4) Nueve menos que algun número N	d) The difference between P and 7
___5) La diferencia entre P y 7	e) The sum of x and 4
___6) 25 más que un número (B)	f) 3 less than N
___7) El cuadrado del radio R	g) S multiplied by 7
___8) S multiplicado por 7	h) Nine less some number N
___9) La mitad del producto de la base por la altura (H)	i) 25 more than a number (B)
___10) 4 veces el número de monedas de diez centavos	j) The square of the radius R

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STRAND RATIONAL NUMBERS OBJECTIVE CODE 4-V-2

OBJECTIVE Given two positive rational numbers with like and unlike denominators, determine their sum or difference.

SUGGESTED ACTIVITIES

In the Spanish-speaking countries the process and format used in operations with rational numbers differ from the process and format used in the United States.

PART I

Spanish-Speaking Countries Method

Addition and subtraction follow the same initial steps. Mixed numerals are converted to improper fractions. The lowest common denominator is used.

$$3\frac{3}{4} + 6\frac{3}{5} =$$

$$\frac{15}{4} + \frac{33}{5} =$$

$$\frac{75 + 132}{20} =$$

$$\frac{207}{20} = 10\frac{7}{20}$$

United States Method

$$3\frac{3}{4} = 3\frac{15}{20}$$

$$+6\frac{3}{5} = 6\frac{12}{20}$$

$$9\frac{27}{20} = 10\frac{7}{20}$$

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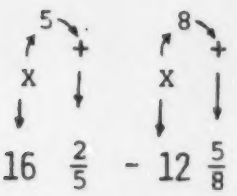
PART I (continued) 4-V-2

The process for subtracting rational numbers is as follows:

Example:

$16\frac{2}{5} - 12\frac{5}{8} =$

The fractions are placed next to each other in a horizontal arrangement, as illustrated at the left.



The mixed numerals are converted to improper fractions. The whole number is multiplied by the respective denominator. The number in the numerator is added to this product.

16 X 5 = 80 12 X 8 = 96
80 + 2 = 82 96 + 5 = 101

$\frac{82}{5} - \frac{101}{8} =$

A common denominator is found by multiplying 5 X 8.

The common denominator is written under the line. The products of 82 times 8 and 101 times 5 are placed in the numerator above the line. The numbers in the numerator are subtracted.

$\frac{656 - 505}{40} = \frac{151}{40}$

The fraction $\frac{151}{40}$ is written to the right of the equal sign.

$\frac{151}{40} = 3\frac{31}{40}$

A mixed numeral is found by dividing the denominator into the numerator. Fractions are reduced to lowest terms.

In the process for adding 16 2/5 and 12 5/8, the numbers in the numerator above the line are added as follows:

$\frac{656 + 505}{40} = \frac{1161}{40} = 29\frac{1}{40}$

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PART II 4-V-2

Suma fracciones a y b. Resta la fracción menor de la mayor.

a	b	SUMA	DIFERENCIA
$6\frac{1}{2}$	$2\frac{5}{7}$	$\frac{91 + 38}{14} = \frac{129}{14}$	$\frac{91 - 38}{14} = \frac{53}{14}$
		$= 9\frac{3}{14}$	$= 3\frac{11}{14}$
$\frac{13}{2}$	$\frac{19}{7}$		

1) $22\frac{1}{3}$ $2\frac{9}{10}$ _____ _____

2) $9\frac{2}{9}$ $9\frac{7}{8}$ _____ _____

3) $7\frac{1}{6}$ $1\frac{5}{12}$ _____ _____

4) $7\frac{4}{5}$ $5\frac{2}{3}$ _____ _____

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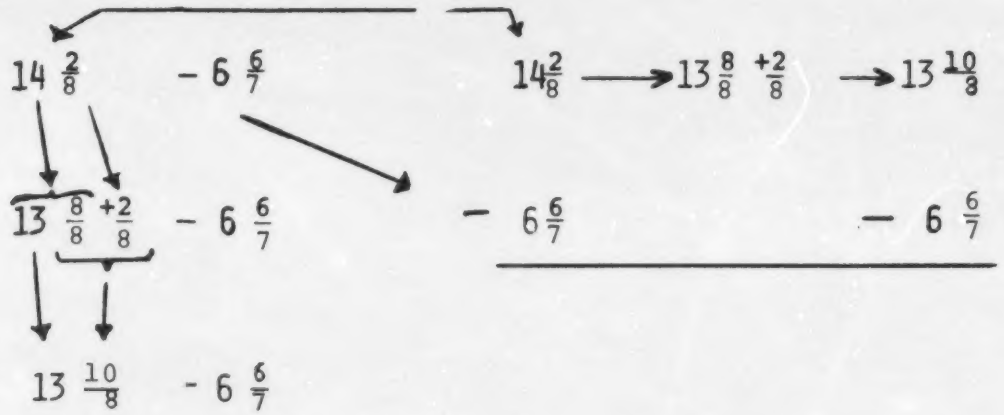
PART III 4-V-2

Assist the students in making the transition from one form of subtraction to the other. Allow the students to use the horizontal notation until the renaming of the whole number and the fraction has been mastered. Follow these steps:



Find a common denominator for 8 and 7.

$\frac{70}{56} - \frac{48}{56} = \frac{22}{56}$

$13 - 6 = 7$

$7\frac{22}{56} =$

$7\frac{11}{28}$

Find a common denominator for 8 and 7.

$13\frac{10}{8} \longrightarrow 13\frac{70}{56}$

$6\frac{6}{7} \longrightarrow 6\frac{48}{56}$

$7\frac{22}{56} = 7\frac{11}{28}$

Subtract the common fractions; then subtract the whole numbers.

Add the two components (7 and $\frac{22}{56}$) to make $7\frac{22}{56}$.

Reduce $\frac{22}{56}$ to lowest terms.

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PART IV 4-V-2

Find the sum or difference of the following fractions:

Encuentra la suma o la diferencia de las siguientes fracciones:

Spanish-Speaking Countries Method

Formato horizontal convirtiendo a fracción impropia.

Ejemplos:

$6\frac{1}{3} + 3\frac{4}{5} =$

$\frac{19}{3} + \frac{19}{5} =$

$\frac{95 + 57}{15} = \frac{152}{15} = 10\frac{2}{15}$ (Suma)

$6\frac{1}{3} - 3\frac{4}{5} =$

$\frac{19}{3} - \frac{19}{5} =$

$\frac{95 - 57}{15} = \frac{38}{15} = 2\frac{8}{15}$ (Diferencia)

United States Method

The vertical form is used without converting to improper fractions.

Examples:

$6\frac{1}{3} \longrightarrow 6\frac{5}{15}$

$+ \; 3\frac{4}{5} \longrightarrow 3\frac{12}{15}$

$9\frac{17}{15} = 10\frac{2}{15}$ (Sum)

$6\frac{1}{3} \rightarrow 6\frac{5}{15} \rightarrow 5\frac{20}{15}$

$3\frac{4}{5} \rightarrow 3\frac{12}{15} \rightarrow 3\frac{12}{15}$

$2\frac{5}{18}$ (Difference)

1) $12\frac{3}{4} + 8\frac{1}{7}$

2) $8\frac{1}{8} - 7\frac{2}{3}$

3) $7\frac{5}{12} + 6\frac{5}{6}$

4) $10\frac{2}{9} - 1\frac{3}{4}$

5) $10\frac{0}{1} + 2\frac{10}{11}$

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STRAND RATIONAL NUMBERS OBJECTIVE CODE 4-V-4

OBJECTIVE Given two decimals, determine their sum or difference.

SUGGESTED ACTIVITIES

In the Spanish-speaking countries, the method for determining the sum of two decimals is the same as the United States method except that in some countries a comma is used instead of a decimal point. The Spanish-speaking countries method for finding the difference between two decimals differs from the United States method.

PART I

Spanish-Speaking Countries Method		United States Method
,4 17	.4 17	3
- ,2 9	- .2 9	.4 17
,1 8	.1 8	.2 9
		.1 8

The process for subtracting decimal fractions is explained in Objective 4-U-11.

The comma is used to separate the whole number from the decimal in several of the Spanish-speaking countries.

The decimal point is used to separate the whole number from the decimal fraction.

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PART II 4-V-4

Halla la suma o la diferencia de los siguientes números:

Ejemplos:

.85	.9¹2	,71	,4¹3
+.39	-.7₁7	+,28	-,1₁7

1) .82
+ .49

2) ,72
- ,54

3) ,35
+ ,78

4) .93
- .56

5) .46
- .28

6) ,74
+ ,65

7) .61
- .42

8) .92
+ .47

9) ,95
- ,68

10) .57
- .29

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PART III

4-V-4

Review the method used in Spanish-speaking countries for finding the difference between two given decimals. Explain the United States method.

Spanish-Speaking Countries Method	United States Method
The subtrahend is renamed mentally by adding the one borrowed from the minuend.	The minuend is modified by taking one from the place to the left, thereby reducing that place by one. The one taken is renamed and added to the place at the right.
.3 ^{1}7 .1 9 .1 8	.~~3~~ ^{2} ^{1}7 .1 9 .1 8
Say: 17 - 9 = 8. Write 8 under the line below the 9. Add one tenth to the subtrahend by returning the 1 tenth borrowed. Say: 3 - 2 = 1. Write 1 under the line below the 1 tenth.	Rename the 3 tenths as 2 tenths and 10 hundredths. Say: 9 from 17 is 8. Write 8 in the hundredths place. Subtract 1 from 2. Write 1 in the tenths place.

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PART IV

4-V-4

Subtract by using both methods.
Resta usando ambos métodos.

Ejemplo:

$$\begin{array}{r} .6\,\overset{1}{6} \\ -.3_{1}7 \\ \hline .2\,9 \end{array}$$

Example:

$$\begin{array}{r} .\cancel{8}\,\overset{5}{\overset{1}{6}} \\ -\ .3\,7 \\ \hline \end{array}$$

1) $\begin{array}{r} 8,41 \\ -\ 3,17 \\ \hline \end{array}$

2) $\begin{array}{r} 25.72 \\ 9.43 \\ \hline \end{array}$

3) $\begin{array}{r} 4.63 \\ -\ 2.45 \\ \hline \end{array}$

4) $\begin{array}{r} 14.84 \\ 6.86 \\ \hline \end{array}$

5) $\begin{array}{r} 13.58 \\ 2.99 \\ \hline \end{array}$

6) $\begin{array}{r} 10.35 \\ -\ 4.17 \\ \hline \end{array}$

7) $\begin{array}{r} 25,37 \\ -\ 14,88 \\ \hline \end{array}$

8) $\begin{array}{r} 35,41 \\ 8,58 \\ \hline \end{array}$

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STRAND RATIONAL NUMBERS OBJECTIVE CODE 4-V-5

OBJECTIVE Given two decimals, determine product or quotient.

SUGGESTED ACTIVITIES

The method and symbol used for division of decimals in Spanish-speaking countries differ from the method and symbol used in the United States. In some Spanish-speaking countries a comma is used instead of a decimal point. (See Objective 4-U-16 for the division algorithm process.)

PART I

Spanish-Speaking Countries Method

Dividendo

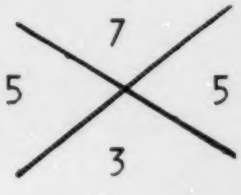
```
86,54 | 4,12   Divisor
 414  | 21,    Cociente
   2
```

United States Method

```
Divisor        21,
4,12 | 86,54   Quotient
       824     Dividend
       ----
       0414
        412
       ----
          2    Remainder
```

The cast-out-nines method is used to check the division algorithm.

The inverse operation is used to check if the division algorithm is correct.



Prueba del nueve

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PART I (continued) 4-V-5

Spanish-Speaking Countries Method

United States Method

The algorithm used for multiplying decimal numbers in Spanish-speaking countries follows the same process as the one used in the United States.

In some Spanish-speaking countries the comma is used to separate the whole number from the decimal fraction.

```
   86,54  Multiplicando
X   4,12  Multiplicador
-----------
   17308
   8654
34616
-----------
356,5448
```

Producto

Prueba del nueve

```
  86.54  Multiplicand
X  4.12  Multiplier
-----------
  17308
  8654
34616
-----------
356.5448  Product
```

The commutative property is used to check the multiplication.

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PART II **4-V-5**

Encuentra los productos y los cocientes de los siguientes números según se indica:

1) 3,4 x 5 =

2) 1 2 x 3 7,5 =

3) 4.2 5 x 3. 4 =

4) 5 1 7 x .8 4 =

5) 1 2 8.8 6 ÷ 8 =

6) 4 2.6 ÷ 1 8.2 =

7) .3 1 2 ÷ 1.0 5 =

8) 7.5 4 ÷ .3 2 =

9) 3 6 3.0 4 x 2 5.0 0 3 =

10) 3 6 3.0 4 ÷ 2 5.0 0 3 =

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PART III 4-V-5

Explain that the division of decimal numbers requires that the dividend and the divisor be increased by a power of 10 when there is a decimal divisor.

Spanish-Speaking Countries Method

68.86 | 3.24

6886. | 324
0406 21
82

United States Method

21.
3.24 | 68.86
648
0406
324
82

324 goes into 688 two times.
Write the 2 under the quotient line below the 2.
Multiply mentally: 4 x 2 = 8.
Subtract mentally: 8 - 8 = 0.
Write 0 under the 8.
Multiply mentally: 2 x 2 = 4.
Subtract mentally: 8 - 4 = 4.
Write 4 under the 8.
Multiply mentally: 3 x 2 = 6.
Subtract mentally: 6 - 6 = 0.
Write 0 under the 6.

Bring the 6 down from the dividend to form 406.
324 goes into 406 one time.
Write 1 under the quotient line to form 21.
Multiply mentally each digit in the divisor by 1.
Subtract mentally each product obtained.

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PART IV 4-V-5

Solve the following problems by using both methods:

Resuelve los siguientes problemas usando ambos métodos:

1) $.48 \overline{)8.92}$

2) $.24 \overline{)8.92}$

3) $18.3 \overline{)75.4}$

4) $.31 \overline{)63.1}$

5) $18593.1 \overline{)4.75}$

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STRAND REAL NUMBERS OBJECTIVE CODE 8-V-2

OBJECTIVE Given a square number, designate its two sets of like factors (positive and negative) and identify the positive factor as the principal square root.

SUGGESTED ACTIVITIES

In most of the Spanish-speaking countries, the negative symbol is written in the upper left corner of the numeral ($\bar{7}$); in some countries the negative symbol is placed above the numeral. In the United States the negative symbol is usually written in front of the numeral (-7).

PART I

Spanish-Speaking Countries Method	United States Method
$49 = (7^2) = 7 \cdot 7$	$49 = (7)^2 = 7 \times 7$
$49 = (\bar{7})^2 = (\bar{7})\ (\bar{7})$	$49 = (-7)^2 = (-7)(-7)$
$49 = (\bar{7})^2 = \bar{7} \cdot \bar{7}$	

The principal square root of 49 is 7.

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PART II 8-V-2

Escribe la raíz cuadrada de estos números. Usa factores positivos.

1) 9

2) 36

3) 144

4) 81

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PART III 8-V-2

Write examples of negative numbers as they are written in the United States and in Spanish-speaking countries. Compare the examples.

Spanish-Speaking Countries Method	United States Method
$\bar{7}$, $\bar{4}$, $\bar{6}$, $^{-}7$, $^{-}4$, $^{-}6$	-7, -4, -6

Use the following procedure to help the student to see how easy it is to move the negative symbol from the position above the number to the position at the left of the number.

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Part IV 8-V-2

Find the square roots of the numbers given below. Use sets of positive and negative factors. Indicate the principal root.

Encuentra las raíces cuadradas de estos números. Usando conjuntos de factores positivos y negativos. Indica la raíz principal.

Spanish-Speaking Countries Method	United States Method
1) 64	2) 100
3) 25	4) 900
5) 225	6) 625
7) 100	8) 1600

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ENGLISH/SPANISH VOCABULARY

The equivalent or the most nearly accurate equivalent Spanish terms have been listed for the English terms used in the mathematical context.

English	Spanish
addend	sumando
adjacent	adyacente
associative property	propiedad asociativa
average	promedio
block, cube	cubo, hexaedro
border	orilla, borde, margen
boundary	límite, linde, lindero
braces, brackets	llaves
cardinality of a set	cardinalidad del conjunto
carry	llevar
Cartesian product	productos cartesianos
cent, penny	centavo, céntimo, centésimo
chalk	gis, tiza
classify	clasifica(r)
clock face	carátula
clock hands	manecillas
compound interest	interest compuesto
corner, vertex	vértice
dates	datos, fechas
digit	cifra, dígito
domain	dominio
edge	arista
eight, eighth	ocho, octavo
empty or null set	conjunto vacio o nulo
encircle	encerrar en un círculo
end points	puntos extremos en toda línea
equal; same	igual; lo mismo, el mismo
even number	número par
expanded notation	notación desarrollada
exponential notation	notación exponencial
finite set	conjunto finito
first	primero, primera
five; fifth	cinco; quinto, quinta
five hundred	quinientos
foot, feet	pie, pies
four; fourth	cuatro; cuarto, cuarta, cuadrante
fraction	fracción, fraccionado, quebrado

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English	Spanish
geoboard	tablero geométrico
graph	graficar, gráfica
greater than, more than	mayor que; más que
greatest common divisor (GCD)	máximo común divisor (MCD)
greatest common factor (GCF)	máximo común divisor (MCD)
half; halves	medio, mitad; medios, mitades
height	altura, alto
hundred; hundredth	cien, ciento; centésimo
hundreds place	centenas
inch	pulgada
income tax	impuesto sobre el sueldo
installment buying	compras a plazos
integers	números enteros
investments	inversiones
least common multiple (LCM)	mínimo común múltiplo (MCM)
left-hand side	a la izquierda
less than	menor que, menos que
mean value	valor medio, medio
measure	medir, medida
measurement	medida
median	centrado, en el medio
mode	modo, serie de valores observados con frequencia
multiplication facts	tablas de multiplicar
narrow	angosto
nine; ninth	nueve; noveno, novena
October 12, 1981 10/12/1981	12 de octubre de 1981 12/10/1981
odd number	número non, impar
one; ones place	uno, una; unidades
one hundredth	un centésimo
one tenth	un décimo
one thousandth	un milésimo
ordered pairs	números ordenados (1, $^{-}4$)
ordinal numbers	números ordinales
outcome	resultado
pair	par, emparejar, formar pares
percent, percentage	porciento, porcentaje
pint (nonexistent in Spanish)	equivale a dos tazas

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English	Spanish
place value	valor relativo de los números
property tax	impuesto sobre la renta
protractor	transportador
quantity	cantidad
quart	un cuarto de galón
quarter	un cuarto de dólar, cuarta parte
quarterly	trimestralmente
quotient	cociente
range	extensión
rate	tasar, valorar, razón
ratio	razón
rational number	número racional
regroup	reagrupar
remainder	residuo
rename	convertir números de un valor a otro (ej. décimos a milésimos)
right-hand side	a la derecha
round, rounding	redondear, redondeando
same	el mismo, lo mismo
sandpaper	papel de lija
scientific notation	notación científica
score	puntuación
semiannually	dos veces por año
sequence	orden, secuencia
sets	conjunto
seven, seventh	siete, séptimo
sides of a right triangle	catetos
six, sixth	seis, sexto
skewed curve	curva oblicua
square	cuadrado
square number	el producto de dos factores iguales, el cuadrado de un número
square root	raíz cuadrada
statistics	estadística
straight	derecho
straightedge	escuadra
straight line	línea recta
stylus	punta metálica del compás
subset	subconjunto
subtrahend	substraendo, sustraendo
subtraction	resta, substracción, sustracción

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English	Spanish
tactual	táctil (tocando con las manos)
tag board	boletín, cantón para hacer etiquetas
take away	restar, quitar, sacar
tax	impuesto
ten thousands place	decenas de millar
ten thousandths place	décimo de millar, diez milésimos
third, one-third	tercero, un tercio
thirty-nine	treinta y nueve
times	tiempos, veces, por
thousand	mil
thousands place	unidades de millar
three times three	tres por tres, 3 veces 3
twenty-five	veinticinco
unit whole	entero, unidad
vertex	vértice
weigh	pesar
weight(s)	peso, pesa(s)
width	ancho
yard	yarda
zero	cero (0)

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SUPPLEMENT FOR CURRICULUM GUIDE FOR MATHEMATICS:
SPANISH-SPEAKING STUDENTS
TEACHER EVALUATION FORM

Use this form to evaluate the supplement. Put a number from 1 to 4 in each box according to the scale below:

4 excellent 3 good 2 fair 1 poor

Return the completed form to the Bureau of Mathematics, Room 838, Department of Curriculum, Mail Run #84.

School _____ _____ District ____ Date _____ Teacher _____

Objective	Part of Lesson	Evaluation				
		Significance of Differentiation	Adequacy of Presentation	Usefulness of Materials	Adequacy of Format	Comments
2-U-3	I					
	II					
	III					
	IV					
2-U-4	I					
	II					
	III					
	IV					
4-U-3	I					
	II					
	III					
	IV					
4-U-6	I					
	II					
	III					
	IV					
4-U-11	I					
	II					
	III					
	IV					
4-U-16	I					
	II					
	III					
	IV					

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Objective	Part of Lesson	Evaluation				
		Significance of Differentiation	Adequacy of Presentation	Usefulness of Materials	Adequacy of Format	Comments
1-V-9	I					
	II					
	III					
	IV					
4-V-2	I					
	II					
	III					
	IV					
4-V-4	I					
	II					
	III					
	IV					
4-V-5	I					
	II					
	III					
	IV					
8-V-2	I					
	II					
	III					
	IV					

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